

# The American Midland Naturalist

Founded by J. A. Nieuwland, C.S.C.

Editor

Robert P. McIntosh

## ASSOCIATE EDITORS

John L. Brooks, Washington, D.C.	Limnology and Hydrobiology
J. H. Bushnell, Boulder, Colorado	Invertebrate Zoology
Leland Chandler, Lafayette, Indiana	Entomology
Lee Ehrman, Purchase, New York	Genetics and Cytology
James Heath, Urbana, Illinois	Comparative Physiology
Duane Isely, Ames, Iowa	Systematic Botany
Richard F. Johnston, Lawrence, Kansas	Ornithology
John A. King, East Lansing, Michigan	Animal Behavior
W. W. Milstead, Austin, Texas	Herpetology
Carl D. Monk, Athens, Georgia	Plant Ecology
Harold A. Mooney, Stanford, California	Plant Physiology
R. F. Morris, Fredericton, N.B., Canada	Animal Ecology
Franklin Sogandares, Missoula, Montana	Parasitology
Royal D. Suttkus, New Orleans, Louisiana	Ichthyology
John O. Whitaker, Terre Haute, Indiana	Mammalogy

Vol. 87, 1972  
(January, April)

## Dates of Publication

No. 1, February 23, 1972

No. 2, May 8, 1972

PUBLISHED BY THE UNIVERSITY OF NOTRE DAME

NOTRE DAME, INDIANA

# CONTENTS

No. 1 — February, 1972

The Ring-necked Pheasant ( <i>Phasianus colchicus torquatus</i> ) as a Host for <i>Heterakis gallinarum</i> and <i>Histomonas meleagridis</i> .....	Everett E. Lund and Anne M. Chute	1
The Effects of Grazing by Snails on Community Structure of Periphyton in Laboratory Streams.....	Peter M. Kehde and Jerry L. Wilhm	8
The Life History of <i>Procambarus hayi</i> .....	James F. Payne	25
A Revision of <i>Echinochloa</i> in the United States.....	F. W. Gould, M. A. Ali and D. E. Fairbrothers	36
The Water Chemistry of Microcosms Associated with the Bromeliad <i>Aechmea bracteata</i> .....	D. H. Benzing, J. A. Derr and J. E. Titus	60
Effect of Deficiencies of Nitrogen, Potassium and Sulfur on Chlorogenic Acids and Scopolin in Sunflower.....	R. H. Lehman and E. L. Rice	71
Habitat Restriction in Giant Sequoia: The Environmental Control of Grove Boundaries.....	Philip W. Rundel	81
Comparison of Seasonal Microclimates of a Wood and Prairie in East-Central Illinois.....	M. D. Morgan and Sylvia M. Old	100
A Study of High Elevational Grassland Communities in Western Montana.....	Robert A. Root and James R. Habeck	109
Seasonal Changes in an Old-Field Spider Community with Comments on Techniques for Evaluating Zoosociological Importance.....	James A. MacMahon and John R. Trigg	122
Culture and Larval Behavior of Photurid Fireflies.....	Miriam McLean, John Buck and Frank E. Hanson	133
Community Ecology of Some Tropical Rain Forest Butterflies.....	Allen M. Young	146
An Experimental Study on the Relation of Mortality of Young to Adult Numbers in Colonies of the Lesser Sac-winged Bat, <i>Saccopteryx bilineata perspicillifer</i> .....	Allen M. Young	158
Biology and Feeding Habits of <i>Zonocerus elegans</i> (Orthoptera: Acrididae) in Central Tanzania.....	Tohko Kaufmann	165
The Ecology of the Silverjaw Minnow, <i>Ericymba buccata</i> Cope.....	Dale C. Wallace	172
Utilization of Southwestern Bat Caves by Terrestrial Carnivores.....	William G. Winkler and Devil B. Adams	191
Mound Development by a Pioneer Population of the Banner-tailed Kangaroo Rat, <i>Dipodomys spectabilis baileyi</i> Goldman, in Eastern New Mexico.....	Troy L. Best	201
Specimens Resembling <i>Microcodium elegans</i> Gluck from Paleozoic Shales of Missouri.....	Joseph M. Wood and Philip W. Basson	207
Drought Resistance in Subalpine Nymphs of <i>Somatochlora semicircularis</i> Selys (Odonata: Corduliidae).....	Ruth L. Willey and Harold O. Eiler	215
Environmental Influence on the Pattern of Plant Communities Along the North Rim of Grand Canyon.....	William L. Halvorson	222
Notes and Discussion		
Seasonal Food Habits of Adult White Crappie, <i>Pomoxis annularis</i> Rafinesque, in Conowingo Reservoir.....	Dilip Mathur	236
Mineral Ion Composition of Halophytic Species from Northern Utah.....	Herman H. Wiebe and Heinrich Walter	241
Two New Species of Troglitic Asellids from the United States.....	Laurence E. Fleming and Harrison R. Steeves III	245
Food Habits of Two Litters of Black-Footed Ferrets in South Dakota.....	Robert G. Sheets, Raymond L. Linder and Robert B. Dahlgren	249
Studies on Centrifugation and Hatching of <i>Schistosoma mansoni</i> Eggs.....	R. B. Holliman, B. M. Wasserman and W. R. Davis	251
Books Received.....		254

# CONTENTS

No. 2 — April, 1972

G. W. Martin: An Appreciation.....	257
Food Habits of the Great Plains Skink ( <i>Eumeces obsoletus</i> ).....	
.....Russell J. Hall	258
Growth, Pelage Development and Maturational Molts of the Mongolian Gerbil, <i>Meriones unguiculatus</i> .....	
.....John J. McManus and William M. Zurich	264
Temperature Regulation and Bioenergetics of the Mongolian Gerbil, <i>Meriones unguiculatus</i> .....	
.....Joseph A. Mele	272
The Swamp Rabbit ( <i>Sylvilagus aquaticus</i> ) in Indiana.....	
.....Ted L. Terrel	283
Altitudinal Zonation of Chipmunks ( <i>Eutamias</i> ): Adaptations to Aridity and High Temperature.....	
.....H. Craig Heller and Thomas Poulson	296
Growth and Age Determination in the Thirteen-Lined Ground Squirrel, <i>Spermophilus tredecimlineatus</i> .....	
.....Earl G. Zimmerman	314
Synopsis of Late Pliocene and Pleistocene Bats of North America and the Antilles.....	
.....Robert A. Martin	326
Trophic Similarity between Species in a Food Web.....	
.....G. C. Gallopín	336
Toward a Quantification of the Ecological Niche.....	
.....William W. Milstead	346
Numerical Densities of Algal Cells and Growth in the Lichen Genus <i>Cladonia</i> .....	
.....Gayther L. Plummer and Betty Derrick Gray	355
Polymorphic and Continuous Variation in the Seeds of Dove Weed, <i>Eremocarpus setigerus</i> (Hook.) Benth.....	
.....Alfred D. Cook	366
A Vegetational Description of a Mid-Missouri Forest Using Gradient Analysis Techniques.....	
.....John J. Rochow	377
Derivation of Species Succession Vectors.....	
.....F. Glenn Goff and Paul H. Zedler	397
The Life History of <i>Branchiura sowerbyi</i> .....	
.....John H. Carroll, Jr. and Troy C. Dorris	413
On the Morphology and Nature of a Leech of the Genus <i>Philobdella</i> ( <i>Hirudinoidea: Macrobdellidae</i> ).....	
.....Laurence R. Richardson	423
Analyses of Benthic Community Structure in a Reservoir by Use of Diversity Indices.....	
.....John D. Ransom and Troy C. Dorris	434
The Origin of Houses in the Okefenokee Prairies.....	
.....Eugene Cypert	448
A Graphic Computation Procedure for Kendall's Tau Suited to Extensive Species-Density Comparisons.....	
.....Arthur W. Ghent	459
Ecological Factors Influencing the Breeding Season Schedule of Western Sandpipers ( <i>Calidris mauri</i> ) in Subarctic Alaska.....	
.....Richard T. Holmes	472
Food of Female Marsh Killifish, <i>Fundulus confluentus</i> Goode and Bean, in Florida.....	
.....R. W. Harrington, Jr. and E. S. Harrington	492
Changes in the Hepatopancreas Metabolic Reserves of <i>Porcellio laevis</i> Latreille During Starvation and the Molt-cycle.....	
.....M. A. Alikhan	503
Food Habits of the Orangebelly Darter, <i>Etheostoma radiosum cyanorum</i> ( <i>Osteichthyes: Percidae</i> ).....	
.....Charles G. Scalet	515
Notes and Discussion	
Species Discrimination by Male Side-blotched Lizards, <i>Uta stansburiana</i> , in Colorado.....	
.....Gary W. Ferguson	523
Small Mammals and Other Prey in the Diet of the Pacific Giant Salamander ( <i>Dicamptodon ensatus</i> ).....	
.....R. Bruce Bury	524
Acceptance of Apholate-treated Bait by Pigeons.....	
.....Robert G. McLean	527
Effects of Testosterone Propionate Implantation on Lek Behavior of Sharp-tailed Grouse.....	
.....Roger J. Trobec and Lewis W. Oring	531
Intergeneric Competition Among Three Bangladesian Birds.....	
.....William W. Milstead and Richard F. Myers	536
Life Cycle and Phenotypic Variation in the Eyes of <i>Procotyla fluviatilis</i> (Leidy) ( <i>Tricladida, Dendrocoelidae</i> ).....	
.....Anne M. Stewart	538

Helminth Parasites of <i>Ictalurus melas</i> , <i>Lepomis cyanellus</i> and <i>Caras-</i> <i>sus auratus</i> from the Ottawa National Wildlife Refuge, Ohio.....	543
.....Mark C. Mondl and Francis C. Rabalais	
External Parasites of Pocket Gophers, <i>Geomys bursarius</i> , from Indi- ana.....	545
.....Richard C. Tuszyński and John O. Whitaker, Jr.	
Metachrosis of the Vertebral Stripe in the Cricket Frog, <i>Acris</i> <i>crepitans</i> .....	549
.....Robert H. Gray	
Effect of Two Sizes of Sherman Traps on Success in Trapping <i>Pero-</i> <i>myscus</i> and <i>Reithrodontomys</i> .....	551
.....Donald S. Kisiel	
Observations of the Second Record of the Least Weasel in Tennessee .....	553
.....Jerry W. Nagel	
Notes on the Biology of <i>Mimetus puritanus</i> Chamberlin (Araneae: Mimetidae).....	554
.....Bruce Cutler	
Observations on the Nitrogen-Fixing Potential of the Plankton of Two Farm Ponds.....	555
.....Dale W. Toetz	
The Contribution of <i>Leptodora</i> and Other Zooplankton to the Diet of Various Fish.....	559
.....Robert R. Costa and Kenneth W. Cummins	
An Estimate of Primary Productivity in a Pennsylvania Trout Stream Using a Diurnal Oxygen Curve Technique.....	564
.....Wayne F. McDiffett, Amy E. Carr and Diane L. Young	
<i>Piceinistrum goeppertianum</i> in <i>Abies lasiocarpa</i> in the Rocky Mountain States.....	570
.....R. G. Krebill	

#### AUTHOR INDEX

Adams, Devil B. ....	191	Halvorson, William L. ....	222
Ali, M. A. ....	36	Hanson, Frank E. ....	133
Alikhan, M. A. ....	503	Harrington, E. S. ....	492
		Harrington, R. W., Jr. ....	492
Basson, Philip W. ....	207	Heller, H. Craig ....	296
Benzing, D. H. ....	60	Holliman, R. B. ....	251
Best, Troy L. ....	201	Holmes, Richard T. ....	472
Buck, John ....	133		
Bury, R. Bruce ....	524	Kaufmann, Tohko ....	165
		Kehde, Peter M. ....	8
Carr, Amy E. ....	564	Kisiel, Donald S. ....	551
Carroll, John H. ....	413	Krebill, R. G. ....	570
Chute, Anne M. ....	1		
Cook, Alfred D. ....	366	Lehman, R. H. ....	71
Costa, Robert R. ....	559	Linder, Raymond L. ....	249
Cummins, Kenneth W. ....	559	Lund, Everett E. ....	1
Cutler, Bruce ....	554		
Cypert, Eugene ....	448	MacMahon, James A. ....	122
		Martin, Robert A. ....	326
Dahlgren, Robert B. ....	249	Mathur, Dilip ....	236
Davis, W. R. ....	251	McDiffett, Wayne F. ....	564
Derr, J. A. ....	60	McLean, Miriam ....	133
Dorris, Troy C. ....	413, 434	McLean, Robert G. ....	527
		McManus, John J. ....	264
Eiler, Harold O. ....	215	Mele, Joseph A. ....	272
		Milstead, William W. ....	346, 536
Fairbrothers, D. E. ....	36	Mondl, Mark C. ....	543
Ferguson, Gary W. ....	523	Morgan, M. D. ....	100
Fleming, Laurence E. ....	245	Myers, Richard F. ....	536
Gallopín, G. C. ....	336		
Ghent, Arthur W. ....	459	Nagel, Jerry W. ....	553
Goff, F. Glenn ....	397		
Gould, F. W. ....	36	Old, Sylvia M. ....	100
Gray, Betty Derrick ....	355	Oring, Lewis W. ....	531
Gray, Robert H. ....	549		
		Payne, James F. ....	25
Habeck, James R. ....	109	Plummer, Gayther L. ....	355
Hall, Russell J. ....	258	Poulson, Thomas ....	296

## AUTHOR INDEX

Rabalais, Francis C. ....	543	Tuszynski, Richard C. ....	545
Ransom, John D. ....	434	Wallace, Dale C. ....	172
Rice, E. L. ....	71	Walter, Heinrich ....	241
Richardson, Laurence R. ....	423	Wasserman, B. M. ....	251
Rochow, John J. ....	377	Whitaker, John O., Jr. ....	545
Root, Robert A. ....	109	Wiebe, Herman H. ....	241
Rundel, Philip W. ....	81	Wilhm, Jerry L. ....	8
Scalet, Charles G. ....	515	Willey, Ruth L. ....	215
Sheets, Robert G. ....	249	Winkler, William G. ....	191
Steeves, Harrison R., III ....	245	Wood, Joseph M. ....	207
Stewart, Anne M. ....	538	Young, Allen ....	146, 158
Terrel, Ted L. ....	283	Young, Diane L. ....	564
Titus, J. E. ....	60	Zedler, Paul H. ....	397
Toetz, Dale W. ....	555	Zimmerman, Earl G. ....	314
Trigg, John R. ....	122	Zurich, William M. ....	264
Tröpec, Roger J. ....	531		

## SUBJECT INDEX

<i>Abies lasiocarpa</i> .....	570	<i>Branchiura sowerbyi</i> .....	413
<i>Acris crepitans</i> .....	549	Brazil, amphibians and reptiles ..	346
<i>Aechmea bracteata</i> .....	60	Breeding, sandpiper .....	472
Age determination, thirteen-lined		species discrimination by lizard	523
ground squirrel .....	314	Bromeliad microcosms .....	60
Alaska, breeding schedule of		Burrows, black-footed ferrets in	
sandpiper .....	472	prairie dog .....	249
Algae, fossil .....	207	kangaroo rat .....	201
density of algal cells in lichens	355	<i>Calidris mauri</i> .....	472
grazing by snails .....	8	California, altitudinal zonation of	
in bromeliads .....	60	chipmunks .....	296
nitrogen-fixing in ponds .....	555	giant sequoia groves .....	81
Amphibians, cricket frog .....	549	variation in seeds of dove weed	366
niche .....	346	Caves, troglolithic asellids sp. n. ..	245
Pacific giant salamander .....	524	utilization by carnivores .....	191
Arizona, plant communities of		Chemosterilant (apholate), for	
Grand Canyon .....	222	pigeons .....	527
<i>Asellus catachetus</i> sp. n. ....	246	Chlorogenic acids in sunflower ....	71
<i>A. cyrtorhynchus</i> sp. n. ....	248	<i>Gladonia</i> .....	355
Bangladesh, interspecific		Colorado, side-blotched lizard ....	515
competition in birds .....	536	<i>Columba livia</i> .....	527
Bats, synopsis of Pliocene and		Community, benthic macro-	
Pleistocene .....	326	invertebrate diversity .....	434
Behavior, firefly larvae .....	133	giant sequoia .....	81
lek behavior in sharp-tailed		Montana grassland .....	109
grouse .....	531	old field .....	71, 122
spider prey capture .....	554	periphyton .....	8
tropical rain forest butterflies ..	146	plant communities of Grand	
Bioenergetics, Mongolian gerbil ..	272	Canyon .....	222
Bioluminescence, firefly .....	133	spider .....	122
Birds, competition .....	536	trophic similarity in a food web	336
lek behavior in sharp-tailed		tropical rain forest butterflies ..	146
grouse .....	531	Costa Rica, bat populations .....	158
parasites of ring-necked		butterfly ecology .....	146
pheasant .....	1	Development, eye number in	
pigeons .....	527	<i>Procytola</i> .....	538
sandpipers .....	572	Mongolian gerbil pelage .....	264
species-density comparison .....	459	moulting in <i>Porcellio</i> .....	503
Books received .....	254	thirteen-lined ground squirrel ..	314

# SUBJECT INDEX

- Devonian, fossil algae ..... 207
- Dicamptodon ensatus* ..... 524
- Dipodomys spectabilis baileyi* ..... 201
- Diversity, benthic macro-
  - invertebrate ..... 434
  - old field spiders ..... 122
  - periphyton ..... 8
- Echinochloa* ..... 36
- Ecology, animal, altitudinal
  - zonation of
    - chipmunks ..... 296
    - bat mortality ..... 158
    - benthic macroinvertebrates ..... 434
    - breeding of sandpipers ..... 472
    - food of marsh killifish ..... 492
    - food web ..... 336
    - old field spiders ..... 122
    - photurid fireflies ..... 133
    - silverjaw minnow ..... 172
    - swamp rabbit ..... 283
    - tropical rain forest butterflies .. 146
- Ecology, plant, allelopathy ..... 71
- giant sequoia habitat ..... 81
- gradient analysis of Missouri
  - forest ..... 377
  - Montana grasslands ..... 109
  - pattern of plant communities .. 222
  - polymorphic variation in dove
    - weed seeds ..... 366
  - species succession vectors in
    - Wisconsin forests ..... 397
  - swamp "houses" ..... 448
  - woodland prairie microclimate 100
- Environment, control of giant
  - sequoia groves ..... 81
  - influence on vegetational
    - pattern ..... 222
    - woods vs. prairie ..... 100
- Eremocarpus setigerus* ..... 366
- Ericymba buccata* ..... 172
- Erratum ..... 256
- Etheostoma radiosum* ..... 515
- Eumeces obsoletus* ..... 258
- Eutamias* ..... 296
- Feeding habits, black-footed
  - ferrets ..... 249
  - great plains skink ..... 258
  - orangebelly darter ..... 515
  - white crappie ..... 236
  - Zonocerus elegans* ..... 165
- Fish, *Carassius auratus* ..... 543
- diet ..... 559
- Ericymba buccata* ..... 172
- Etheostoma radiosum* ..... 515
- Fundulus confluentus* ..... 472
- Ictalurus melas* ..... 543
- Lepomis cyanellus* ..... 543
- parasites ..... 543
- Pomoxis annularis* ..... 236
- Florida, marsh killifish ..... 492
- Okefenokee swamp ..... 448
- Food, marsh killifish ..... 492
- consumption of Mongolian
  - gerbil ..... 272
  - great plains skink ..... 258
  - sandpipers ..... 483
  - Pacific giant salamander ..... 524
- Forest, Missouri ..... 377
- Wisconsin ..... 397
- Fossil, algae ..... 207
- bats ..... 326
- Fundulus confluentus* ..... 492
- Fungi, rust on fir ..... 570
- Geographic distribution, swamp
  - rabbit in Indiana ..... 283
- Geomys bursarius* ..... 545
- Georgia, new species of *Asellus* .. 245
- Okefenokee swamp ..... 448
- Growth, *Cladonia* ..... 355
- Mongolian gerbil ..... 264
- thirteen-lined ground squirrel .. 314
- Halophytes, mineral ion
  - composition ..... 241
- Hatching, of *Schistosoma* eggs ... 251
- Helianthus annuus* ..... 71
- Heterakis gallinarum* ..... 1
- Histomonas meleagridis* ..... 1
- Illinois, woodland-prairie
  - microclimates ..... 100
- Indiana, silverjaw minnow ecology 172
- swamp rabbit ..... 283
- Insects, fireflies ..... 133
- larvae culturing ..... 133
- Somatochlora semicircularis* .... 215
- tropical rain forest butterflies .. 146
- Zonocerus elegans* ..... 165
- Invertebrates (other than insects)
  - asellids ..... 245
  - benthic macroinvertebrates ..... 434
  - Branchiura sowerbyi* ..... 413
  - crustacean physiology ..... 503
  - eye number in *Procotyla* ..... 538
  - leech ..... 423
  - Procambarus hayi* ..... 25
  - snails ..... 8
- Kendall's tau ..... 459
- Leptodora* ..... 559
- Life history, *Branchiura sowerbyi* 413
- Procambarus hayi* ..... 25
- Limnology, benthic macro-
  - invertebrates ..... 434
  - nitrogen fixation ..... 555
- Mammals, bats ..... 158, 191, 326
- carnivores ..... 191



# SUBJECT INDEX

- Mongolian gerbil .....264, 272
- rodents .....201, 249, 264,  
272, 283, 296, 314, 545, 551
- trapping .....551
- Martin, G. W., An appreciation .. 257
- Meriones unguiculatus* .....264, 272
- Metachrosis, cricket frog .....549
- Microclimate, woods vs. prairie .. 100
- Microcodium elegans* .....207
- Microcosms, bromeliad leaf bases .. 60
- Mimetus puritanus* .....554
- Missouri, forests .....377
- fossil algae .....207
- Montana, high elevation
- grassland .....109
- Morphology, leech .....423
- Moulting and hepatopancreas
- metabolic reserve .....503
- Mustela nigripes* .....249
- M. nivalis* .....553
- New Mexico, banner-tailed
- kangaroo rat .....201
- Niche, *Eutamias* .....296
- quantification .....346
- Nitrogen fixation .....555
- North Dakota, sharp-tailed grouse
- behavior .....531
- Nutrients, deficiency effect on
- chlorogenic acid in
- Helianthus annuus* .....71
- ion composition of halophytes .. 241
- Ohio, old field spiders .....122
- fish parasites .....543
- Oklahoma, *Branchiura sowerbyi* .. 413
- food of orangebelly darter .....515
- Paleozoic, fossil algae .....207
- Parasites, bird
- helminth parasites of fish .....543
- Heterakis* .....1
- Histomonas* .....1
- pocket gopher external
- parasites .....545
- Schistosoma* eggs .....251
- Pennsylvanian, fossil algae .....207
- Phasianus colchicus torquatus* .... 1
- Philobdella* .....423
- Physiology, development of firefly
- larvae .....133
- drought resistance in dragonfly
- metabolic reserves of
- hepatopancreas .....503
- nutrient deficiency in
- Helianthus* .....71
- thermoregulation of gerbil .....272
- water relations of *Eutamias* .....296
- water relations of giant sequoia .. 81
- Phytosociology, giant sequoia
- groves .....81
- gradient analysis of Missouri
- forests .....377
- high elevational grassland .....109
- plant communities of Grand
- Canyon .....222
- Wisconsin forest succession .....397
- Pimephales notatus* .....172
- Pleistocene, bats .....326
- Pliocene, bats .....326
- Pomoxis annularis* .....236
- Populations, mortality in bats .....158
- Porcellio laevis* .....503
- Procambarus hayi* .....25
- Procotyla fluviatilis* .....538
- Productivity, periphyton .....8
- Pucciniastrum goeppertianum* .... 570
- Reptiles, Great Plains skink..... 258
- niche .....346
- side-blotched lizard .....523
- Saccopteryx bilineata perspicillifer* 158
- Schistosoma mansoni* .....251
- Scopolin in sunflower .....71
- Seasonal change, in old field
- spiders .....122
- in silverjaw minnow habitat .... 182
- in food habits of white crappie .. 236
- Seeds, variation in *Eremocarpus*
- setigerus* .....366
- Sequoiadendron giganteum* .....81
- Somatochlora semicircularis* .....215
- South Dakota, black-footed ferrets 249
- Spermophilus tredecimlineatus* .. 314
- Statistics, Kendall's tau .....459
- Streams, ecology of silverjaw
- minnow .....172
- laboratory .....8
- Strip mines, effect on silverjaw
- minnow .....182
- Subalpine, pools .....215
- Succession, old field .....71
- swamp, Okefenokee .....448
- vectors in Wisconsin forest .... 397
- Swamp, Okefenokee .....448
- Sylvilagus aquaticus* .....283
- Systematics, *Echinochloa* .....36
- Tanzania, *Zonocerus elegans*
- feeding habits .....165
- Tennessee, least weasel .....553
- Texas, amphibians and reptiles .... 346
- banner-tailed kangaroo rat .....201
- Trapping, effect of trap size .....551
- Trophic similarity in predators .... 336
- Tropical rain forest, bat
- populations .....158
- butterflies .....146
- Uta stansburiana* .....523
- Utah, halophytic species in .....241

# SUBJECT INDEX

Vegetation, giant sequoia groves	81	Canyon	222
grassland in Montana	109	swamp "houses"	448
ordination of forests of		Wisconsin, forest succession	397
Missouri	377	<i>Zonocerus elegans</i>	165
ordination of forests of		Zooplankton, as fish food	559
Wisconsin	397	Zoosociology, spider	122
plant communities of Grand			



# The American Midland Naturalist

Founded by J. A. Nieuwland, C.S.C.

Editor

Robert P. McIntosh

## ASSOCIATE EDITORS

John L. Brooks, Washington, D.C.	Limnology and Hydrobiology
J. H. Bushnell, Boulder, Colorado	Invertebrate Zoology
Leland Chandler, Lafayette, Indiana	Entomology
Lee Ehrman, Purchase, New York	Genetics and Cytology
James Heath, Urbana, Illinois	Comparative Physiology
Duane Isely, Ames, Iowa	Systematic Botany
Richard F. Johnston, Lawrence, Kansas	Ornithology
John A. King, East Lansing, Michigan	Animal Behavior
Norman D. Levine, Urbana, Illinois	Parasitology
W. W. Milstead, Austin, Texas	Herpetology
Carl D. Monk, Athens, Georgia	Plant Ecology
Harold A. Mooney, Stanford, California	Plant Physiology
R. F. Morris, Fredericton, N.B., Canada	Animal Ecology
Royal D. Suttkus, New Orleans, Louisiana	Ichthyology
John O. Whitaker, Terre Haute, Indiana	Mammalogy

Vol. 88, 1972

(July, October)

## Dates of Publication

No. 1, August 2, 1972

No. 2, October 18, 1972

PUBLISHED BY THE UNIVERSITY OF NOTRE DAME

NOTRE DAME, INDIANA

## CONTENTS

### No. 1 — August, 1972

Studies of the Biogeochemistry of Boron. I. Concentrations in Surface Waters, Rainfall and Aquatic Plants.....	
.....Claude E. Boyd and W. Wayne Walley	1
A Method for Exact Testing of 2X2, 2X3, 3X3, and Other Contingency Tables, Employing Binomial Coefficients.....	15
.....Arthur W. Ghent	28
On Objective Functions of Phytosociological Resemblance.....	
.....Laszlo Orloci	
Cluster Analysis of Data from Limnological Surveys of the Upper Potomac River.....	56
.....Roger L. Kaesler and John Cairns, Jr.	
The Relationship of Fresh-water Macroinvertebrate Communities Collected by Floating Artificial Substrates to the MacArthur-Wilson Equilibrium Model.....	68
.....Kenneth L. Dickson and John Cairns, Jr.	
Food, Feeding Selectivity and Ecological Efficiencies of <i>Fundulus notatus</i> (Cyprinodontidae).....	76
.....Gerald L. Atmar and K. W. Stewart	
Fish Species Diversity in Relation to Stream Order and Physicochemical Conditions in the Plum Creek Drainage Basin.....	
.....B. G. Whiteside and Randy M. McNatt	90
Differential Predation by <i>Gambusia affinis</i> on the Eggs of Seven Species of Anuran Amphibians.....	102
.....Jerry C. Grubb	
Interspecific Interactions and Limiting Factors of Abundance and Distribution in the Red River Pupfish, <i>Cyprinodon rubrofluviatilis</i> .....	
.....Anthony A. Echelle, Alice F. Echelle and Loren G. Hill	109
Tandem Linkage, Sperm Translocation, and Copulation in the Dragonfly, <i>Hagenius brevistylus</i> (Odonota: Gomphidae).....	131
.....Clifford Johnson	
Natural Insect Populations and Assortative Mating.....	150
.....L. G. Mason	
A Survey of the Epigeic Triclad Turbellarians of Tennessee.....	
.....Julian T. Darlington and Clay M. Chandler	158
Observations on the Ecology of <i>Astragalus tennesseensis</i> .....	
.....Carol C. Baskin, Jerry M. Baskin and Elsie Quarterman	167
Rapid Evolution in Populations of <i>Galinsoga ciliata</i> (Compositae) in Western Massachusetts.....	
.....Nancy N. Shontz and John P. Shontz	183
Primary Production and Soil Relations in an Illinois Sand Prairie.....	
.....J. D. Baier, F. A. Bazzaz, L. C. Bliss and W. R. Boggess	200
Aspects of the Ecology of a Sonoran Desert Population of the Western Banded Gecko, <i>Coleonyx variegatus</i> (Sauria, Eublepharinae).....	
.....William S. Parker	209
Distribution of <i>Stigmaria wedingtonensis</i> (Lycopsida) in the Chesterian (Upper Mississippian) of North America.....	225
.....Hermann W. Pfefferkorn	
Notes and Discussion	
Pseudo-Copulatory Behavior in <i>Eutamias minimus</i> in an Enclosure.....	
.....Raymond E. Reilly	232
Chlorophyll and the Margalef Pigment Ratio in a Mountain Lake.....	
.....B. J. Mathis	232
Change in Caloric Content of Adult Males of <i>Mysis relicta</i> (Loven) During a Diel Migratory Cycle.....	
.....Mitsuo Teraguchi, Thomas E. Wissing and Arthur D. Hasler	235
Relationships of Weight, Length and Body Composition in the Medaka, <i>Oryzias latipes</i> .....	
.....Glenn A. Kaufman and Robert J. Beyers	239
Thermal Responses of the Orb-weaving Spider, <i>Nephila clavipes</i> (Araneae: Argiopidae).....	
.....Thomas Krakauer	245
Temperature Measurements of the Spadix of <i>Symplocarpus foetidus</i> (L.) Nutt.....	
.....Roger M. Knutson	251
Flight Speed of the Gray Bat, <i>Myotis grisescens</i> .....	
.....Michael L. Kennedy and Troy L. Best	254
First Record of <i>Cervalces scotti</i> Ledekker from the Pleistocene of Ohio.....	
.....Richard S. Mills and John E. Guilday	255
Books Received.....	256

## CONTENTS

No. 2 — October, 1972

Use of State and Private Lands by Pheasants and Waterfowl in South Dakota.....	Charles R. Elliott and Raymond L. Linder	257
Adoptive Behavior of Caged Pheasants Exposed to Chicks and Dieldrin.....	Kay L. Cool, Raymond L. Linder and Donald R. Progulske	262
Aspects of Behavioral Ecology of Red-headed and Red-bellied Woodpeckers.....	Ann Willbern Reller	270
Food and Feeding Behavior of the Mink Frog, <i>Rana septentrionalis</i> Baird, in Minnesota.....	Stanley E. Hedeon	291
Osteology and Evolution in Neotropical Bufo.....	Robert F. Martin	301
Influence of Germination Date on Survival and Seed Production in a Natural Population of <i>Leavenworthia stylosa</i> .....	Jerry M. Baskin and Carol C. Baskin	318
Allelopathic Mechanisms of <i>Arctostaphylos glandulosa</i> var. <i>zacaensis</i> .....	Chang-Hung Chou and Cornelius H. Muller	324
Subalpine Cover Associations of <i>Eutamias amoenus</i> and <i>Eutamias townsendii</i> in the Washington Cascades.....	Don H. Meredith	348
Pollen Analysis of a Central Texas Bog.....	Donald A. Larson, Vaughn M. Bryant and Tom S. Patty	358
Seasonal Movement and Home Range of the Longear Sunfish, <i>Lepomis megalotis</i> (Rafinesque) in Louisiana.....	Tim M. Berra and Gerald E. Gunning	368
The Influence of Organic Drift on the Food Habits and Life History of the Yellowfin Shiner, <i>Notropis lutipinnis</i> (Jordan and Brayton).....	William K. Reisen	376
Island Populations of Small Mammals and Their Affinities with Vegetation Type, Island Size and Distance from Mainland.....	A. Bradley McPherson and John N. Krull	384
The Benthic Fauna in Four Small Southern Appalachian Streams.....	W. Robert Woodall, Jr. and J. Bruce Wallace	393
Benthic Invertebrates in Lake Ashtabula Reservoir, North Dakota.....	John J. Peterka	408
Reproductive Ecology of a West Texas Population of the Greater Earless Lizard, <i>Cophosaurus texanus</i> .....	Royce E. Ballinger, Earl D. Tyler and Donald W. Tinkle	419
Comparative Water Loss in Relation to Habitat Selection in Small Colubrid Snakes.....	Gerald E. Elick and John A. Sealander	429
Winter Coexistence of <i>Clethrionomys gapperi</i> and <i>Microtus pennsylvanicus</i> in a Grassland Habitat.....	Stuart L. Iverson and Brian N. Turner	440
Net Photosynthesis and Respiration of <i>Cladonia subtenuis</i> (Abb.) Evans, and Comparison with a Northern Lichen Species.....	Mary M. Peet and Michael S. Adams	446

### Notes and Discussion

Studies on Southern Sisyridae (Spongilla-flies) with a Key to the Third-Instar Larvae and Additional Sponge-Host Records.....	Michael A. Poirrier and Yvonne M. Arceneaux	455
The Carotid Circulation of <i>Chinchilla laniger</i> .....	Margaret L. T. Poon and John J. McManus	458
A Trap for Capturing Black-footed Ferrets.....	Robert G. Sheets	461
Pipistrelle Bats Attracted to Vocalizing Females and to a Blacklight Insect Trap.....	Michael J. O'Farrell and Bruce W. Miller	462
Two-headed White-tailed Deer Fetus.....	Kieth E. Severson, Harold E. Messner and Donald R. Dietz	464
Sagebrush Vole ( <i>Lagurus curtatus</i> ) in South Dakota.....	Elmer C. Birney and Richard P. Lampe	466
A Recent Record of the Meadow Jumping Mouse, <i>Zapus hudsonius</i> , in Subarctic Canada.....	Gary L. Krapu and David L. Traugher	467

A Diurnal Colony of Big Freetail Bats, <i>Tadarida macrotis</i> (Gray), in Chihuahua, Mexico.....	David A. Easterla	468
<i>Trichodina chlorophora</i> Richards, 1948, from <i>Physa gyrina</i> Say in Southern Illinois with a Redescription of the Species.....	Lawrence J. Blecka and George Garoian	470
<i>Paragonimus kellicotti</i> in Kentucky.....	John P. Harley	474
Snook ( <i>Centropomus</i> : <i>Centropomidae</i> ): New Host for Lymphocystis, Including Observations on the Ultrastructure of the Virus.....	Harold D. Howse	476
Photosynthetic Characteristics of Three Species of Sagebrush as Related to Their Distribution Patterns in the White Mountains of California.....	Marda West and H. A. Mooney	479
The Comparative Osteology of the Caudal Skeleton of Some North American Minnows ( <i>Cyprinidae</i> ).....	Paul J. Buhan	484
Manual of the Vascular Plants of Texas: I. Additions and Corrections.....	Donovan S. Correll	490
Nurse Shark Pectoral Fins: An Unusual Use.....	Sanford A. Moss	496
Notes on the Occurrence of Endogone in Soils and Seeds from Cultivated Fields in Vigo County, Indiana.....	Wayne C. Houtcooper	497
Movements of Adult Tidewater Silverside, <i>Menidia beryllina</i> (Cope), Tagged in New England Waters.....	James G. Hoff	499
Diurnal Variation in the Oxygen Consumption of <i>Plethodon cinereus</i> .....	Sandra L. Stern and Charles F. Mueller	502
<i>Algites hakeiensis</i> sp. nov. A Cretaceous Foliose Alga from Lebanon.....	Philip W. Basson	506
Predation on a Snake by <i>Spermophilus tridecemlineatus</i> .....	Harry E. Wistrand	511
Request for Information.....	Raymond McNeil	512

#### AUTHOR INDEX

Adams, Michael S. ....	446	Echelle, Alice F. ....	109
Arceneaux, Yvonne M. ....	455	Echelle, Anthony A. ....	109
Atmar, Gerald L. ....	76	Elick, Gerald E. ....	429
Baier, J. D. ....	200	Elliott, Charles R. ....	257
Ballinger, Royce E. ....	419	Garoian, George ....	470
Baskin, Carol C. ....	167, 318	Ghent, Arthur W. ....	15
Baskin, Jerry M. ....	167, 318	Grubb, Jerry C. ....	102
Basson, Philip W. ....	506	Guilday, John E. ....	255
Bazzaz, F. A. ....	200	Gunning, Gerald E. ....	368
Berra, Tim M. ....	368	Harley, John P. ....	474
Best, Troy L. ....	254	Hasler, Arthur D. ....	235
Beyers, Robert J. ....	239	Hedeen, Stanley E. ....	291
Birney, Elmer C. ....	466	Hill, Loren G. ....	109
Blecka, Lawrence J. ....	470	Hoff, James G. ....	499
Bliss, L. C. ....	200	Houtcooper, Wayne C. ....	497
Boggess, W. R. ....	200	Howse, Harold D. ....	476
Boyd, Claude E. ....	1	Iverson, Stuart L. ....	440
Bryant, Vaughn M. ....	358	Johnson, Clifford ....	131
Buhan, Paul J. ....	484	Kaesler, Roger L. ....	56
Cairns, John, Jr. ....	56, 68	Kaufman, Glennis A. ....	239
Chandler, Clay M. ....	158	Kennedy, Michael L. ....	254
Chou, Chang-Hung ....	324	Knutson, Roger M. ....	251
Cool, Kay L. ....	262	Krakauer, Thomas ....	245
Correll, Donovan S. ....	490	Krapu, Gary L. ....	467
Darlington, Julian T. ....	158	Krull, John M. ....	384
Dickson, Kenneth L. ....	68		
Dietz, Donald R. ....	464		
Easterla, David A. ....	468		

# AUTHOR INDEX

Lampe, Richard P. ....	466	Poon, Margaret L. T. ....	458
Larson, Donald A. ....	358	Progulske, Donald R. ....	262
Linder, Raymond L. ....	257, 262	Quarterman, Elsie ....	167
Martin, Robert F. ....	301	Reilly, Raymond E. ....	232
Mason, L. G. ....	150	Reisen, William K. ....	376
Mathis, B. J. ....	232	Reller, Ann Willbern ....	270
McManus, John J. ....	458	Sealander, John A. ....	429
McNatt, Randy M. ....	90	Severson, Kieth E. ....	464
McNeil, Raymond ....	512	Sheets, Robert G. ....	461
McPherson, A. Bradley ....	384	Shontz, John P. ....	183
Meredith, Don H. ....	348	Shontz, Nancy N. ....	183
Messner, Harold E. ....	464	Stern, Sandra L. ....	502
Miller, Bruce W. ....	462	Stewart, K. W. ....	76
Mills, Richard S. ....	255	Teraguchi, Mitsuo ....	235
Mooney, H. A. ....	479	Tinkle, Donald W. ....	419
Moss, Sanford A. ....	496	Traugher, David L. ....	467
Mueller, Charles F. ....	502	Turner, Brian N. ....	440
Muller, Cornelius H. ....	324	Tyler, Earl D. ....	419
O'Farrell, Michael J. ....	462	Wallace, J. Bruce ....	393
Orloci, Laszlo ....	28	Walley, W. Wayne ....	1
Parker, William S. ....	209	West, Marda ....	479
Patty, Tom S. ....	358	Whiteside, B. G. ....	90
Peet, Mary M. ....	446	Wissing, Thomas E. ....	235
Peterka, John J. ....	408	Wistrand, Harry E. ....	511
Pfefferkorn, Hermann W. ....	225	Woodall, W. Robert, Jr. ....	393
Poirrier, Michael A. ....	455		

# SUBJECT INDEX

Algae, fossil ....	506	pseudo-copulation in <i>Eutamias</i> ....	232
<i>Algites hakelensis</i> sp. nov. ....	506	thermal response of spider ....	245
Allelopathy, <i>Arctostaphylos</i> ....		woodpecker ....	270
<i>glandulosa</i> ....	324	Binomial coefficients ....	15
Amphibians, <i>Bufo</i> osteology ....	301	Biogeochemistry, boron ....	1
fish predation on eggs of		Birds, pheasant ....	257, 262
anurans ....	102	waterfowl ....	257
<i>Plethodon cinereus</i> ....	502	woodpeckers ....	270
<i>Rana septentrionalis</i> behavior ..	291	Books received ....	256
Anatomy, <i>Bufo</i> osteology ....	301	Boron ....	1
carotid circulation of		California, allelopathy in	
<i>Chinchilla</i> ....	458	chaparral ....	324
Aquatic plants, boron ....	1	photosynthesis in <i>Artemisia</i> ....	479
Arachnids, <i>Nephila clavipes</i> ....	245	<i>Centropomus undecimalis</i> ....	476
<i>Arctostaphylos glandulosa</i> ....	324	<i>Centurus carolinus</i> ....	270
<i>Artemisia</i> , photosynthesis in ....	479	<i>Cervantes scotti</i> ....	254
Assortative mating, insects ....	150	Chaparral, allelopathy ....	324
<i>Astragalus tennesseensis</i> ....	167	<i>Chauliognathus pennsylvanicus</i> ..	150
Behavior, adoptive behavior of		<i>Chinchilla laniger</i> ....	458
pheasant ....	262	<i>Cladonia subtenuis</i> ....	446
assortative mating ....	150	<i>Clethrionomys gapperi</i> ....	440
<i>Cyprinodon rubrofluviatilis</i> ....	109	<i>Coleonyx variegatus</i> ....	207
dragonfly copulation ....	131	Community, stability ....	68
feeding of <i>Fundulus notatus</i> ....	76	Contingency tables, exact testing	15
feeding of <i>Rana septentrionalis</i>	291	<i>Cophosaurus texanus</i> ....	419
feeding of nurse shark ....	496	Cretaceous algae ....	506
pipistrelle bats ....	462	<i>Cyprinodon rubrofluviatilis</i> ....	109
predation by <i>Gambusia</i> ....	102		

# SUBJECT INDEX

Desert, <i>Coleonyx variegatus</i> population .....	209	seeds .....	497
Diversity, fish .....	90	<i>Galinsoga ciliata</i> .....	183
macroinvertebrates .....	68	<i>Gambusia affinis</i> .....	102
Ecology animal, <i>Coleonyx variegatus</i> .....	209	<i>Ginglymostoma cirratum</i> .....	496
distribution of <i>Cyprinodon rubrofluviatilis</i> .....	109	<i>Hagenius brevistylus</i> .....	131
efficiency of <i>Fundulus notatus</i> .....	76	Home range, of <i>Menidia beryllina</i> .....	499
feeding of <i>Rana septentrionalis</i> .....	291	Illinois, primary production in	
fish diversity .....	90	prairie .....	200
home range of <i>Lepomis megalotis</i> .....	368	small mammals .....	384
insect populations .....	150	<i>Stigmara wedingtonensis</i> .....	225
macroinvertebrate diversity .....	68	Indiana, Endogone in cultivated	
predation by <i>Gambusia affinis</i> .....	102	fields .....	497
reproduction of <i>Cophosaurus texanus</i> .....	419	Insects, assortative mating in	
thermal responses of spiders .....	245	Coleoptera .....	150
trapping <i>Mustela</i> .....	461	benthic stream fauna .....	393
woodpecker behavior .....	270	sperm transfer in dragonfly .....	131
Ecology, plant, allelopathy in		Sisyridae .....	455
<i>Arctostaphylos glandulosa</i> .....	324	Invertebrates (other than insects)	
boron biogeochemistry .....	1	benthic stream fauna .....	393
<i>Leavenworthia stylosa</i> .....		benthic lake fauna .....	408
germination .....	318	of artificial substrates .....	68
primary production in prairie ..	200	<i>Mysis relicta</i> .....	235
phytosociological resemblance ..	28	<i>Physa gyrina</i> .....	470
temperature of <i>Symplocarpus foetidus</i> .....	251	sampling .....	68
primary production in prairie ..	200	sponges, fly parasites on .....	455
Efficiency, of <i>Fundulus notatus</i> ..	76	<i>Trichodina chlorophora</i> .....	470
Elasmobranch .....	496	Triclad turbellarians .....	158
<i>Endogone</i> sp. ....	497	Islands, small mammal	
<i>Eutamias amoenus</i> .....	348	populations .....	384
<i>E. minimus</i> .....	232	<i>Juncus effusus</i> .....	1
<i>E. townsendii</i> .....	348	Kentucky, <i>Paragonimus kellicotti</i> ..	474
Evolution, <i>Bufo</i> .....	301	<i>Lagurus curtatus</i> .....	466
in <i>Galinsoga ciliata</i> .....	183	<i>Leavenworthia stylosa</i> .....	318
Exact testing of 2X2 tables .....		Lebanon, Cretaceous algae .....	506
extended to larger tables .....	15	<i>Lepomis megalotis</i> .....	368
Feeding, of <i>Notropis lutipinnis</i> ....	376	Lichens, photosynthesis and	
of <i>Rana septentrionalis</i> .....	291	respiration of <i>Cladonia</i> .....	446
selectivity of <i>Fundulus notatus</i> ..	76	Life history, <i>Astragalus</i>	
Fish, <i>Centropomus undecimalis</i> ..	476	<i>tennesseensis</i> .....	167
<i>Cyprinodon rubrofluviatilis</i> .....	109	<i>Coleonyx variegatus</i> .....	209
diversity .....	90	<i>Notropis lutipinnis</i> .....	376
<i>Fundulus notatus</i> .....	76	<i>Paragonimus kellicotti</i> .....	474
<i>Gambusia affinis</i> .....	102	Limnology, benthic	
<i>Lepomis megalotis</i> .....	368	invertebrates .....	393, 408
<i>Menidia beryllina</i> .....	499	cluster analysis from upper	
<i>Notropis lutipinnis</i> .....	239	Potomac River .....	56
<i>Oryzias latipes</i> .....	239	pigment ratio in lake .....	232
osteology of Cyprinidae .....	484	Louisiana, home range of	
Flight, speed of gray bat .....	254	<i>Lepomis megalotis</i> .....	368
Fossil, algae .....	506	Lymphocystis .....	476
<i>Stigmara wedingtonensis</i> .....	225	Macroinvertebrates .....	68
<i>Fundulus notatus</i> .....	76	Macrophytes, boron levels .....	1
Fungi, Endogone in soils and		Mammals, <i>Clethrionomys gapperi</i> ..	440



# SUBJECT INDEX

- Eutamias minimus* ..... 232
- Eutamias amoenus*,  
    *E. townsendii* ..... 348
- flight speed of *Myotis*  
    *grisescens* ..... 254
- Lagurus curtatus* ..... 466
- Microtus pennsylvanicus* ..... 440
- Mustela nigripes* ..... 461
- pipistrelle bats ..... 462
- Spermophilus tridecemlineatus*.. 511
- Tadarida macrotis* ..... 468
- Zapus hudsonius* ..... 467
- Manual of vascular plants of  
    Texas additions and  
    corrections ..... 490
- Massachusetts, populations of  
    *Galinsoga ciliata* ..... 183
- Mathematical methods, cluster  
    analysis ..... 56
- contingency tables ..... 15
- MacArthur-Wilson model ..... 68
- resemblance (similarity)  
        functions ..... 28
- Melanerpes erythrocephalus* ..... 270
- Menidia beryllina* ..... 499
- Mexico, bat colony in Chihuahua  
    *Microtus pennsylvanicus* ..... 440
- Minnesota, *Rana septentrionalis* .. 291
- Mississippian, plant fossils ..... 225
- Missouri, lichen metabolism ..... 446
- Mustela nigripes* ..... 461
- Myotis grisescens* ..... 254
- Mysis relicta* ..... 235
- Nephila clavipes* ..... 245
- Nevada, *Stigmara*  
    *wedingtonensis* ..... 225
- Niche, separation in *Eutamias* .... 348
- winter coexistence in rodents .. 429
- woodpeckers ..... 270
- North Carolina, benthic stream  
    fauna ..... 393
- North Dakota, benthic lake fauna .. 408
- Notropis lutipinnis* ..... 376
- Odocoileus virginianus* ..... 464
- Ohio, Pleistocene moose ..... 254
- Oklahoma, distribution of  
    *Cyprinodon rubrofluviatilis* .. 108
- Oryzias latipes* ..... 239
- Osteology, *Bufo* ..... 301
- Cyprinidae ..... 484
- Paleobotany, *Stigmara*  
    *wedingtonensis* ..... 225
- Palynology, Central Texas bog .... 358
- Paragonimus kellicotti* ..... 474
- Parasites, *Paragonimus kellicotti* .. 474
- Trichodina chlorophora* ..... 470
- Pesticides, dieldrin ..... 262
- Phasianus colchicus* ..... 257, 262
- Physa gyrina*, host for *Trichodina*  
    *chlorophora* ..... 470
- Physiology, animal, caloric content  
    of *Mysis relicta* ..... 235
- growth of medaka ..... 239
- oxygen consumption of  
        *Plethodon* ..... 502
- thermal responses of spider ..... 245
- water loss of colubrid snakes ... 429
- Physiology, plant, *Margalef*  
    pigment ratio ..... 232
- photosynthesis in *Artemisia* .... 479
- photosynthesis and respiration  
        of *Cladonia* ..... 446
- temperature of spadix of  
        *Symplocarpus* ..... 251
- Phytosociology, resemblance  
    (similarity) functions ..... 28
- Pipistrellus hesperus* ..... 462
- Platyhelminthes ..... 158
- Pleistocene, record of *Cervalces*  
    *scotti* ..... 255
- Plethodon cinereus* ..... 502
- Populations, abundance and  
    distribution in *Cyprinodon* .. 109
- assortative mating in Coleoptera .. 150
- evolution in *Galinsoga ciliata* .. 183
- Potomac River, limnological  
    surveys ..... 56
- Prairie, primary production ..... 200
- Predation, *Gambusia affinis* ..... 102
- Spermophilus tridecemlineatus*  
        on snake ..... 511
- Production, primary ..... 200
- Rana septentrionalis* ..... 291
- Reproduction, dragonfly ..... 131
- Reptiles, *Coleonyx variegatus* ..... 209
- Cophosaurus texanus* ..... 419
- predation on *Coluber* ..... 511
- water loss of colubrid snakes ... 429
- Seed, germination of  
    *Leavenworthia stylosa* ..... 318
- Soil, and primary productivity of  
    prairie ..... 200
- moisture and colubrid snakes .. 429
- South Carolina, *Notropis*  
    *lutipinnis* ..... 376
- South Dakota, *Lagurus curtatus* .. 466
- pheasants and waterfowl ..... 257
- Spermophilus tridecemlineatus* .... 511
- Stigmara wedingtonensis* ..... 225
- Streams, benthic invertebrates .... 393
- distribution of *Cyprinodon*  
        *rubrofluviatilis* ..... 109
- diversity of fish ..... 90
- Potomac River ..... 56
- triclad turbellarians ..... 158
- Subalpine, cover associations of



# SUBJECT INDEX

<i>Eutamias</i> .....	348	food and feeding of <i>Fundulus</i>	
<i>Symplocarpus foeditus</i> .....	251	<i>notatus</i> .....	76
Systematics, animal, <i>Bufo</i> .....	301	pollen analysis of bog .....	358
<i>Tadarida macrotis</i> .....	468	reproduction of <i>Cophosaurus</i>	
Temperature, and lichen		<i>texanus</i> .....	419
metabolism .....	446	vascular plants Manual .....	490
of <i>Symplocarpus</i> spadix .....	251	<i>Trichodina chlorophora</i> .....	470
response of orb-weaving spider .....	245	<i>Typha latifolia</i> .....	1
Tennessee, cedar glades .....	167, 318	Virus, Lymphocystis .....	476
<i>Myotis grisescens</i> .....	254	Washington, vegetation cover of	
triclad turbellarians .....	158	<i>Eutamias</i> .....	348
<i>Tetraopes tetrophthalmus</i> .....	150	Water, surface, boron in .....	1
Texas, distribution of <i>Cyprinodon</i>		Wisconsin, lichen metabolism .....	446
<i>rubrofluvialis</i> .....	109	<i>Zapus hudsonius</i> .....	467
fish diversity .....	90		
fish predation of anuran eggs ..	102		

